

LARVAE OF SIX SPECIES OF GENUS APHODIUS FROM
EASTERN NIGERIA
(COLEOPTERA: SCARABAEIDAE)

BY M. L. JERATH AND K. L. UNNY^{1, 2}

The coprophagus beetles of the genus *Aphodius*, which has world-wide distribution, are represented in West Africa by many species. The larvae are completely unknown from West Africa.

In this paper larvae of six species of the genus *Aphodius* are described and keys presented for their identification. The larvae of five species were collected in small dung cells usually about 3-6 inches deep in the soil under dung. Larvae of one *Aphodius* species, however, were collected from a cabbage bed in Obudu Plateau (at an altitude of 6,000 ft.) where the larvae were feeding on the cabbage roots.

Aphodius larvae from Nigeria agree in essential characters with those of British *Aphodius* characterized by Van Emden (1941) and American and Australian species described by Jerath (1960). The Nigerian species, however, differ from those of America and Australia in having only one row of setae on the tenth abdominal segment. The terminology used in this work is the same as in the writer's earlier work on Aphodiinae (Jerath, 1960).

Aphodius Illiger

LARVAL DESCRIPTION: Frons, on each side, with two short posterior frontal setae and a microsensilla, a short anterior frontal seta and a microsensilla, a long exterior frontal seta and a microsensilla, and a long seta at the anterior angle. First antennal segment apparently subdivided. Clypeus marked into pre- and post-clypeus and with three setae on either side. Scissorial area of left mandible with S_1+2 , S_3 and S_4 and of right mandible with S_1+2 and S_3+4 . Each mandible dorsally with two or three setae and ventrally with three or four setae. Galea dorsally with more than four setae. Abdominal segments 1-8, each with three dorsal annulets; dorsa of segments nine and ten not divided. Lower anal lobe emarginate.

KEY TO KNOWN LARVAE OF APHODIUS OF NIGERIA

- | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1. | Raster without palidia ----- | 2 |
| | Raster with palidia; maxillary stridulatory area with 15-18 teeth; galea ventrally with 7 short and one long seta; raster with 23-25 tegillar setae ----- | DETRUNCATUS |
| 2. | Third antennal segment with a flattened sensory area at apex ----- | 3 |
| | Third antennal segment with a conical sensory structure at apex ----- | 4 |
| 3. | Epipharynx with tormae unequal; maxillary stridulatory teeth absent on palpifer; galea ventrally with a row of 7 short setae; raster with 18-19 tegillar setae ----- | APHODIUS SP. |
| | Epipharynx with tormae more or less equal in size and shape; maxillary stridulatory teeth present on palpifer; galea ventrally with a row of 9-11 short setae; raster with 21-27 tegillar setae ----- | NOVUS |

¹ Agriculture Research Station, Umudike-Umuahia, Nigeria.

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4.

Stridulatory area with nine or more conical teeth; galea ventrally with a row of 27 or more setae-----

5
- Stridulatory area with 5-6 stridulatory teeth; galea ventrally with a row of 10-12 short setae; raster with 34-43 tegillar setae-----

VENALIS
5.

Palpifer without teeth, galea ventrally with a row of 34-36 short setae; raster with 42-48 tegillar setae -----

SENEGALENSIS
- Palpifer with two teeth, galea ventrally with a row of 27-29 short setae, raster with 58-62 tegillar setae -----

MACULICOLLIS

Aphodius (Blackburneus) detruncatus Schmidt
(FIG. 8)

MATERIAL STUDIED: Three third-instar larvae collected in soil at Obudu on May 28, 1962, by M. L. Jerath. Reared adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.24-1.42 mm. Cranium yellowish-brown, surface smooth except for three depressions, on each side on the frons; 3-4 dorso-epicranial setae on each side. Second and third antennal segments subequal, first longer than second or third. Third antennal segment apically with a conical sensory process.

Epipharynx with protophoba bistichous on left and monostichous on right; protophoba with 19-20 microsensillae. Tormae similar in size and shape and both tormae produced cephalad and caudad. Crepide subcircular. Epitorma asymmetrical and short.

Maxillary stridulatory area with an irregular row of 9-11 conical teeth. Galea, ventrally with a long seta and a longitudinal row of seven setae, dorsally with four setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with six short setae, each scutum with 4-5 small and 3-4 long setae on each side, each scutellum with eight short setae. Each abdominal spiracle-bearing area with 1-2 setae dorsally.

Raster with two short, longitudinal palidia, surrounded on the sides by scattered 23-25 tegillar setae. Each palidium with 4-5 caudomesally directed spine-like setae.

Aphodius sp.
(FIGS. 1, 3, 4, 7, 9)

MATERIAL STUDIED: Ten third-instar larvae, being a part of several larvae collected in cabbage bed at Obudu on May 28, 1962, by M. L. Jerath. This is a new species and the adults will be described separately.

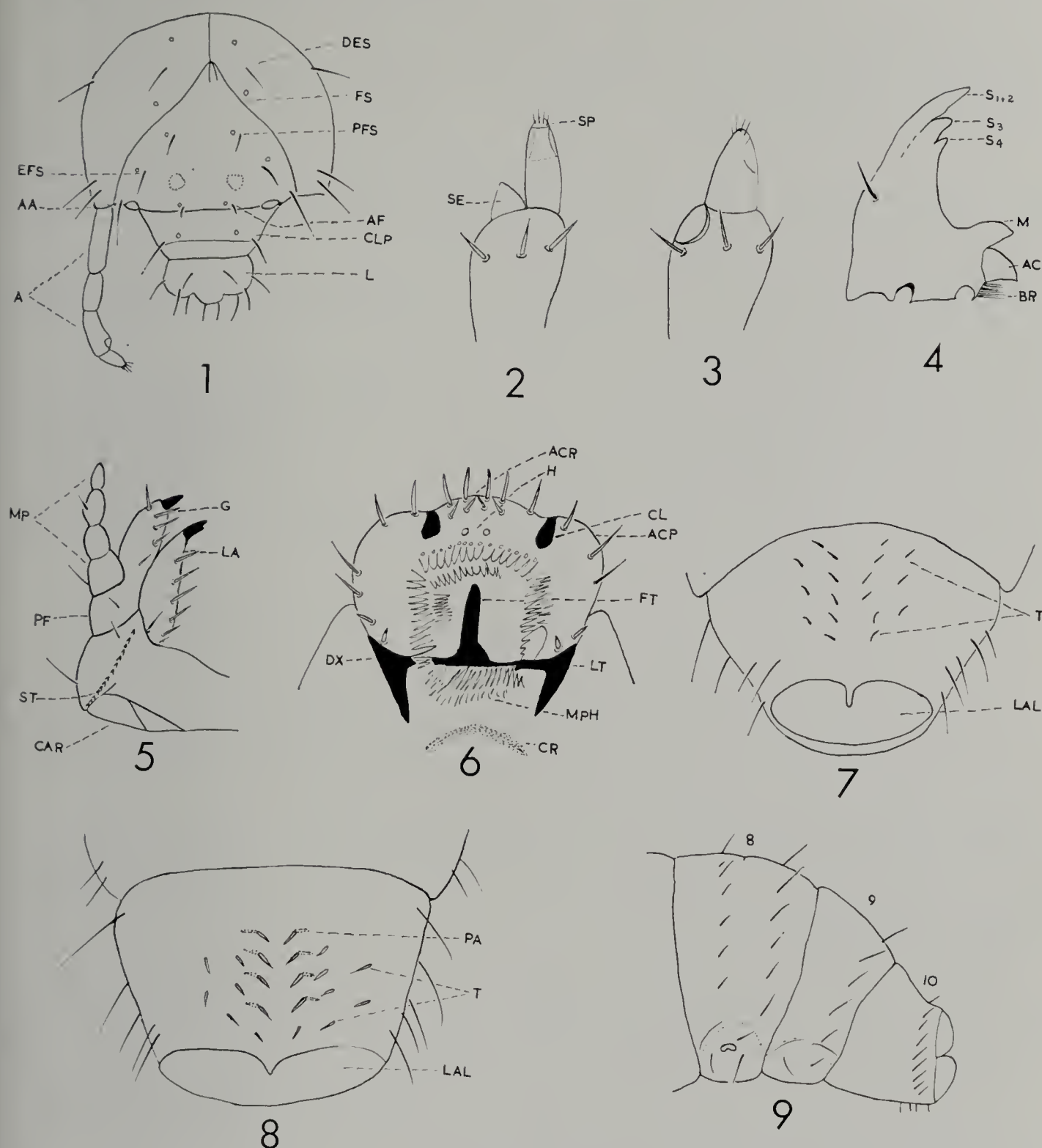
DESCRIPTION: Maximum width of head capsule of third-stage larva 1.04-1.24 mm. Cranium light-yellow, surface smooth except two depressions, on each side on frons. Second and third antennal segments subequal but each shorter than the first. Third antennal segment with a round sensory area apically.

Epipharynx with protophoba bistichous on left and monostichous on right; protophoba with 16-18 microsensillae. Tormae not similar in size and shape, dextrotorma produced cephalad and caudad; laeotorma only produced cephalad. Crepide small; epitorma asymmetrical, flattened apically and slightly bent towards laeophoba.

Maxillary stridulatory area with two irregular rows of 5-9 conical teeth; palpifer with teeth. Galea, ventrally with a long seta and a longitudinal row of 7 short setae, dorsally with 3-4 setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Abdominal segments 1-5, each with three dorsal annulets; each prescutum with 6-8 short setae; each scutum with 5-6 short setae and 1-2 long setae, on each side; and each scutellum with 10-12 short setae. Each abdominal spiracle-bearing area with 2-3 setae.

Raster with teges of 18-19 short setae arranged in four rows of 5-6 setae in inner rows and 3-4 setae in the outer rows.



FIGURES 1-9, Larvae of *Aphodius* spp.

Aphodius sp. 1—Head capsule. 3—Last antennal segment. 4—Left mandible, dorsal view. 7—Raster. 9—Lateral view of 8th to 10th abdominal segments.

A. senegalensis. 2—Last antennal segment. 5—Maxilla, ventral view.

A. maculicollis. 6—Epipharynx.

A. detruncatus. 8—Raster.

Symbols: A—Antenna. AA—Seta of anterior frontal angle. AC—Acia. ACP—Acanthoparia. ACR—Acroparia. AF—Anterior frontal seta. BR—Brustia. CAR—Cardo. CL—Clithrum. CLP—Clypeus. DES—Dorsoepicranial setae. DX—Dextortoma. EPS—Exterior frontal seta. FS—Frontal suture. G—Galea. H—Hypotomerum. L—Labrum. LA—Lacinia. LAL—Lower anal lip. LT—Laeotoma. M—Molar area. MP—Maxillary palpus. MPH—Mesophoba. PA—Palidium. PFS—Posterior frontal seta. PLA—Pladium. S—Scissorial teeth. SE—Sensory organ. SP—Sensory pegs. ST—Maxillary stridulatory area. T—Teges.

Aphodius (Blackburneus) novus Schmidt

MATERIAL STUDIED: Five third-instar larvae, associated with adults, collected under dung at Obudu on May 28, 1962, by M. L. Jerath. The associated adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.08-1.20 mm. Cranium light-yellow, surface smooth except for three depressions on either side. Second and third antennal segments subequal, first longer than second or third. Third antennal segment apically with a sensory spot.

Epipharynx with protophoba bistichous on left and monostichous on right, protophoba with 22-24 microsensillae. Tormae similar in size and shape and both produced cephalad and caudad. Crepide sub-triangular. Epitorma asymmetrical, slender and slightly flattened apically.

Maxillary stridulatory area with a row of 6-7 conical teeth, palpifer with 2-3 conical teeth. Galea, ventrally with a long seta and a longitudinal row of 9-11 short setae, dorsally with four setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 6-8 short setae, each scutum with 4-5 short and 2 long setae on each side, each scutellum with 8-10 short setae. Each abdominal spiracle-bearing area with 1-2 setae dorsally.

Raster with teges of 21-27 short setae arranged irregularly in rows of 4-6 setae.

Aphodius (Nialus) venalis Schmidt

MATERIAL STUDIED: Fifteen third-instar larvae, associated with several larvae, reared to adult stage. Larvae collected under dung at Ajali Cashew Plantation on May 15, 1963, by M. L. Jerath.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.06-1.14 mm. Cranium light-yellow, surface smooth except for three depressions on each side on frons; 1-2 dorso-epicranial setae on each side. First and second antennal segments subequal, third slightly shorter than first or second. Third antennal segment apically with sensory conical process.

Epipharynx with protophoba bistichous on left and monostichous on right. Protophoba with 15-17 microsensillae. Tormae more or less similar in size and shape, and both produced cephalad and caudad. Crepide subtriangular. Epitorma asymmetrically flattened and bent towards the laeophoba.

Maxillary stridulatory area with a row of 5-6 conical teeth, palpifer with one tooth. Galea ventrally with a long setae and a longitudinal row of 10-12 short setae, dorsally with five setae. Lacinia dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 6 short setae, each scutum with 4-5 short setae and 2-3 long setae on each side, each scutellum with 10 short setae. Setae are very minute and insignificant. Each abdominal spiracle-bearing area with one seta dorsally and 1-2 setae ventrally.

Raster with teges of 34-43 short setae scattered irregularly on the venter of 10th abdominal segment.

Aphodius (Colobopterus) senegalensis Klug

(Figs. 2, 5)

MATERIAL STUDIED: Three third-instar larvae collected with adults at School of Agriculture, Umudike, under cow dung, during April 1961,

by M. L. Jerath. Associated adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 2.42-2.83 mm. Cranium light-yellow, surface smooth except two depressions on each side on the frons, with 3-4 dorso-epicranial setae and three microsensillae on each side. Second and third antennal segments subequal but each shorter than first. Third antennal segment apically bears a conical sensory process.

Epipharynx with protophoba bistichous and with 21-23 microsensillae. Tormae similar in shape, both produced cephalad and caudad. Crepide semicircular. Epitorma asymmetrical, short and membranous apically.

Maxillary stridulatory area with 15-18 conical teeth arranged in a row; palpifer without teeth. Galea, ventrally with a long seta and a longitudinal row of 34-36 closely placed setae, dorsally with 4-5 long and 1-2 short setae. Lacinia, dorsally with a row of 5-6 long setae near the mesal edge and one short seta posteriorly.

Abdominal segments 1-5, each with three dorsal annulets; each prescutum with 11-13 short setae, each scutum with 14-16 short setae and 2-3 long setae on each side, each scutellum with 14-15 setae. Each abdominal spiracle-bearing area with 1-2 short setae dorsally.

Raster with teges of 42-48 short setae arranged in two groups, one on either side.

Aphodius (Colobopterus) maculicollis Reiche

(FIG. 6)

MATERIAL STUDIED: Three third-instar larvae and cast skins of two third-instar larvae reared to the adult stage. Larvae collected under cow manure at School of Agriculture, Umudike, by M. L. Jerath, during July, 1962. Reared adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.77-1.94 mm. Cranium light-yellow, surface smooth except for two depressions on each side on frons. Second and third antennal segments subequal, first segment longer than second or third. Third antennal segment with a conical sensory process.

Epipharynx with protophoba bistichous and with 14-15 microsensillae. Tormae similar in size and shape both produced cephalad and caudad. Crepide semicircular; epitorma with a flattened base but conical apically.

Maxillary stridulatory area with a row of 11-13 conical teeth and two near the base of palpifer. Galea, ventrally with a long seta and a longitudinal row of 27-29 closely pressed short setae, dorsally with five long and one short setae. Lacinia, dorsally with a row of five long and one short setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 8-10 short setae, each scutum with 10-11 short setae and 4-5 long setae on each side, and each scutellum with 10-13 setae. Each abdominal spiracle-bearing area with 2-3 setae ventrally and 2 setae dorsally.

Raster with teges of 58-62 short setae arranged more or less in two groups of 29-32 setae; each group of more or less irregular rows.

LITERATURE CITED

JERATH, M. L.

1960. Notes on larvae of nine genera of Aphodiinae in the United States. (Coleoptera: Scarabaeidae). Proc. U. S. National Museum 111 (3425): 43-94.

EMDEN, F. I. VAN

1941. Larvae of British beetles II. A key to the British Lamellicornia larvae. Ent. Mo. Mag. 77:117-127, 181-192, illus.